

THE PALEONTOLOGY AND GEOLOGY OF THE BADWATER CREEK AREA, CENTRAL WYOMING

Part 4. Late Eocene Primates from Badwater, Wyoming, with a Discussion of Material from Utah

PETER ROBINSON

University of Colorado Museum

COMMENTS ON LATE EOCENE PRIMATES

The primate fauna of the upper Eocene rocks of the Badwater area, Wyoming, shows slight but definite relationships to the late Eocene (Uintan) and early Oligocene (North Boulder Creek, Montana) primate occurrences in the Rocky Mountains and less relationship to the late Eocene (Sespe) fauna of California. One specimen of a primate referable with doubt to *Chumashius* (originally described from the late Eocene of California) is recorded from Badwater. *Macrotarsius siegerti*, new species, which is relatively common at Badwater, is probably related linearly to the earlier *Hemiacodon jepseni*, new species, and the later *Macrotarsius montanus* Clark. The Badwater occurrences of *Uintasorex* and *Phenacolemur* are the youngest known and show relationships with the Rocky Mountain Bridgerian *Uintasorex* and the Wasatchian and Tiffanian genus *Phenacolemur*.

The Badwater Primates are considered to be equivalent in age to the late Uintan fauna (Mytonian) of Utah. They might possibly be slightly younger but the development of *Macrotarsius* would preclude correlation with older faunas.

Collections from three Eocene localities have convinced me that the primate fauna of any one Eocene formation is more complex than usually realized. These three are: Locality II-Huerfano Formation (American Museum, Yale, University of Colorado collections), Powder Wash-Green River Formation (Carnegie Museum), Locality 5A-Tepee Trail Formation, Badwater Creek collections (Carnegie Museum, University of Colorado). In each case the number of primate species is a significant percentage of the total mammalian fauna known, perhaps 20%.

Submitted for publication May 10, 1967
Issued June 27, 1968

Lack of a significant microfauna locality in the upper Bridger Formation affects the general picture. It is odd that the Anaptomorphidae are rare in post-Bridgerian Eocene deposits and I agree that this rarity is due to collecting bias and lack of proper facies in upper Eocene rocks (Black, 1967).

The relationships of the Badwater Primates to those from outside North America are not close. Eocene Primates from China, such as *Hoanghoni* and *Lushius* (see Simons, 1963, fig. 11) are quite different from the taxa described here. The Anaptomorphidae are predominantly Nearctic, Paromomyidae are exclusively Nearctic, and the family Omomyidae has only four Palearctic genera (*Cantius* Simons, 1962, is a junior synonym of *Pelycodus*, fide Donald Russell). The greatest resemblance of the primate faunas of the new and old world is in the late Paleocene and early Eocene (Russell, 1964). From the early Eocene on there appears to be very little relationship in the Primates and one may assume that during the middle Eocene connection was broken or minimized and that the American forms evolved independently.

I have used the infraordinal term Lorisiformes for the Omomyidae. This allocation seems most practical to me because the known characters of the dentition fit that group better than the Tarsiiformes to which they are usually allocated, or than the Lemuriformes where Wilson (1966) has placed *Rooneyia* and by inference the Omomyidae. The Omomyidae seem to me to be farther separated from the Anaptomorphidae than Simpson (1945) or Gazin (1958) would have them. The main reason for grouping the two together is that they are very small, generally Nearctic Primates, with a reduction in the number of premolars. The premolar and molar morphology of the families are quite different and seemingly consistent within the groups, with the slight exception of the Mytoniinae described below. If *Rooneyia* is indeed an omomyid then the morphology of the skull is certainly not tarsiiform. Whether it is lorisiform or lemuriform is open to question.

EXPLANATORY NOTES

The following abbreviations are used: I, incisor; C, canine; P, premolar (with a superscript, upper; with a subscript, lower); M, molar; W, width; L, length; Buc., buccal; Ling., lingual; Tr., trigonid; Tal., talonid; Hld., hypoconulid; l, left; r, right; AMNH, American Museum of Natural History; CM, Carnegie Museum; UCM, University of

cient materials of the lineage *Hemiacodon-Macrotarsius* (Simons, 1961) to define it with reasonable certainty and to show many of the stages through which the group evolved. Indeed it is possible to show that although *H. gracilis* (figs. 13, 20) of the Bridgerian and *M. montanus* (figs. 5, 6) of the Chadronian are distinct and generically separable entities the division of the genera and species in the late Eocene is difficult at best. One might consider the lineage a temporal cline, a normal situation for any lineage that is well known.

Gazin (1958) and Simons (1961) have discussed the Uintan omomyid *Ourayia*. The type specimen of *Ourayia*, AMNH 1899, is distinct from the Princeton materials assigned to the genus by Simons and is considered here to be in a separate subfamily. I find that the Princeton specimen figured by Simons (PUM 16431) is a large *Hemiacodon* and is described below as *H. jepseni*. The material from Badwater has passed the stage of evolution of the P_4 found in *Macrotarsius* but is otherwise very close to PUM 16431. *M. montanus* and the Badwater *M. siegerti* are similar in morphology but *M. montanus* is larger.

Three stages of dental evolution can therefore be distinguished in these species (if they are an actual lineage): first, an increase in size from *H. gracilis* to *H. jepseni*; second, a change in morphology of the P^4-M^2 and P_4-M_2 of *H. jepseni* to *M. siegerti* and finally, another increase in size from *M. siegerti* to *M. montanus* (cf. Simons, 1961: 5—*O. uintensis* of Simons essentially = *H. jepseni* of this paper).

*Hemiacodon jepseni*¹, new species

Figures 8, 16, 21

Figured in Simons, 1961, figs. 1, 2, 3

Ourayia uintensis (Osborn) Simons, 1961 (in part), p. 6

TYPE: PUM 16431, r and l dentaries and maxillae with most of dentition [dentition (except P_2) represented on one or other tooth row].

REFERRED MATERIAL: PUM 11236, r and l dentaries with parts of P_3-M_3 .

HORIZON AND LOCALITIES: Uinta Formation, Uinta B; White River Pocket (type) and Kennedy's Hole (referred specimen).

DIAGNOSIS: Slightly larger than *H. gracilis*, P_4 with paraconid and metaconid low and not as large as in *Macrotarsius*; mesostyle of M^{1-3} developed (unlike

¹ Named in honor of Professor Glenn L. Jepsen of Princeton University who has done so much to accumulate the record of early Cenozoic mammals.

H. gracilis which has only a small mesostyle on some individuals; Gazin, 1958, pl. 8, fig. 1); tooth enamel crenulate. (Detailed description in Simons, 1961)

DISCUSSION: I have seen six specimens of Uinta Formation Primates: PUM 11236, PUM 16431; YPM 15266; AMNH 1899, AMNH 1900; CM 12309. The two Princeton specimens represent one species although they do differ in the development of the hypoconulid of M_3 (a variable character in prosimians, cf. Robinson 1957, p. 13, pl. 1, fig. 3). AMNH 1899, the type of *Ourayia uintensis*, is quite different in the morphology of the P_3 and M_2 , and slightly so in the morphology of P_4 and M_1 . Although the M_3 is missing from the type of *Ourayia uintensis*, the radical change of the shape of the trigonid from a paraconid bearing M_1 to a paraconid-less M_3 is significant. The same species should not have, as a variation, the trigonids similar to each other found in the lower molars of PUM 16431 and 11236. Gazin's well illustrated monograph on the middle and late Eocene Primates shows the basic differences in the trigonid morphology of Nearctic prosimians.

There are differences in the location and development of the crista obliqua of the P_4 . In *Hemicacodon gracilis*, *H. jepseni*, and *Ourayia uintensis* the crista obliqua descends from the protoconid to the posterobuccal corner of the tooth, and the posterior surface of the trigonid is flat. In *Mytonius hopsoni* the crista obliqua originates part way down the back of the protoconid and descends to the posterior margin of the tooth, mesiad of the posterobuccal corner.

The crista obliqua of the lower molars of *Hemicacodon gracilis* and *H. jepseni* proceeds antero-lingual from the hypoconid, and close to the trigonid has a slight buccal trend ending on the side of the protoconid. In *Ourayia uintensis* and *M. hopsoni*, described below, the crista obliqua of M_{1-2} is not as well developed and ends at the base of the trigonid.

Gazin (1958, plate 8) shows that there is considerable variation in the rugosity of the enamel of *H. gracilis*, but in all forms the posterior surface of the trigonid is not as smooth as *O. uintensis* and *M. hopsoni*.

?Hemicacodon sp.

Figure 18

MATERIAL: CM 15068, left M_1 (?) from locality 5A, Badwater Creek.

This tooth is particularly interesting because of its smooth enamel. It is too small to be referred to *H. jepseni* and is approximately the same size as *H. gracilis* from the middle Eocene. However, *H. gracilis*

tends also to have crenulate enamel and this tooth does not. Because of the well-developed hypoconulid the talonid does not resemble the same portion of teeth of *Anaptomorphus*, *Ourayia*, or *Mytonius*. *Macrotarsius*, *Notharctus*, and *Smilodectes* have a well-developed notch between the hypoconulid and the entoconid, whereas the posterior margin of the tooth in CM 15068 is not interrupted.

The tooth is referred, with doubt, to *Hemiacodon*.

Genus *Macrotarsius* Clark, 1941

*Macrotarsius siegerti*¹, new species

Figures 2, 4, 7, 14, 17

TYPE: CM 15122, rP₄ from locality 5A, Badwater Creek area, Wyoming.

REFERRED MATERIAL: M₃—CM 14601, CM 15674; M₁ or M₂—CM 15147, CM 15068, CM 15072; P₄—UCM 26009; I-UCM 25276; M¹⁻³—CM 14549, CM 15056; M²⁻³—CM 15056; P⁴—CM 15610, CM 15717; P⁴-M³—CM 18646; and other tooth fragments.

HORIZON AND LOCALITIES: Late Eocene (Mytonian) Badwater Creek localities 5 front, 5 back, 5A, 6, Wood (for Badwater locality designations see Black and Dawson, 1966).

¹ Named in honor of the late Dr. J. G. B. Sievert, of Trinidad, West Indies.

Fig. 1. CM 15647, crown view of IM₂ of *Uintasorex* sp. cf. *U. parvulus*, from Badwater Creek, Wyoming.

Fig. 2. CM 15122, crown view of rP₄ of *Macrotarsius siegerti*, new species, TYPE, from Badwater Creek, Wyoming.

Fig. 3. CM 15066, crown view of rM₁ of ?*Trogolemur* sp. from Badwater Creek, Wyoming.

Fig. 4. CM 15147, crown view of rM₁ or M₂ of *Macrotarsius siegerti*, new species, from Badwater Creek, Wyoming.

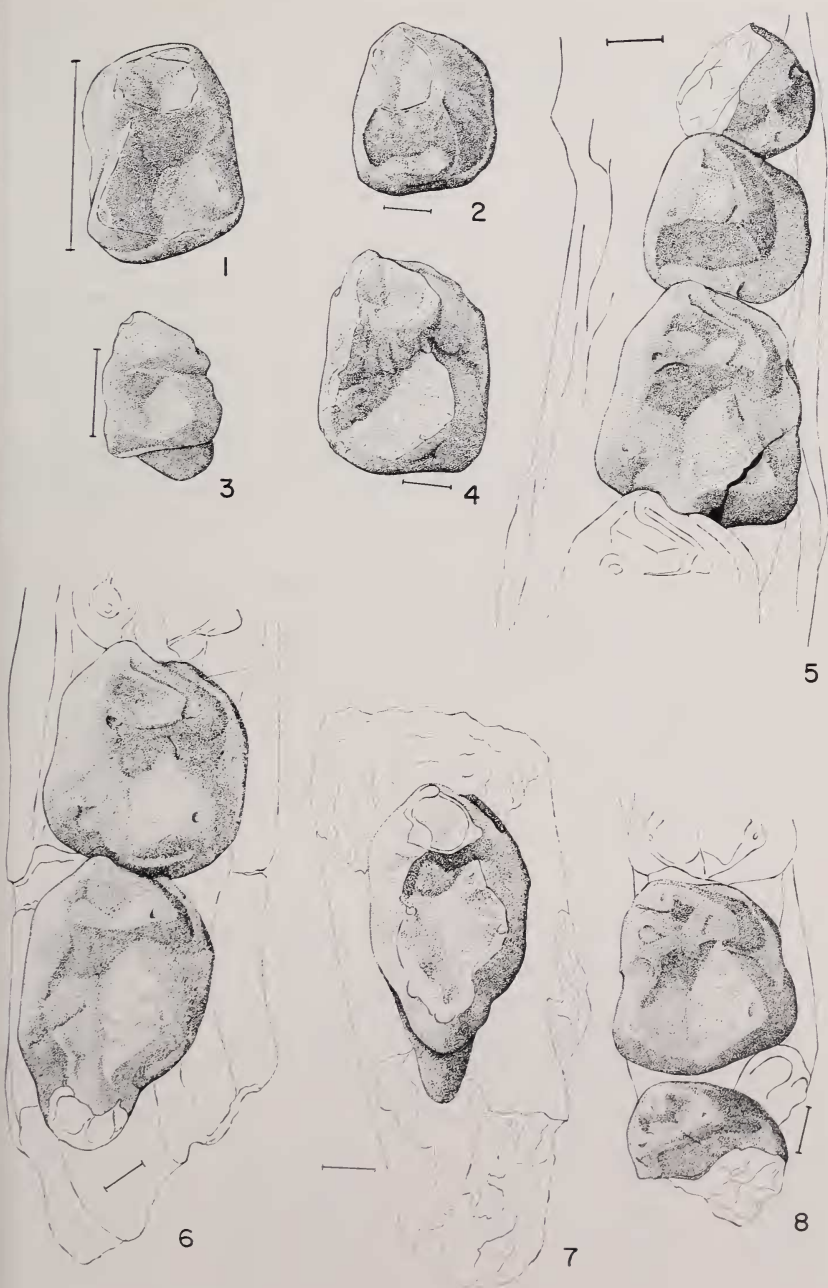
Fig. 5. CM 9592, Crown view of P₃-M₁ of *Macrotarsius montanus*, TYPE, from the lower Oligocene rocks of North Boulder Valley, Montana.

Fig. 6. CM 9592, Crown view of M₂₋₃ of *Macrotarsius montanus*, TYPE, from the lower Oligocene rocks of North Boulder Valley, Montana.

Fig. 7 CM 14601, crown view of rM₃ of *Macrotarsius siegerti*, new species, from Badwater Creek, Wyoming.

Fig. 8. PUM 16431, crown view of rM₂, ½M₃ of *Hemiacodon jepseni*, new species, TYPE, from the Uinta Formation of northeastern Utah.

The bar beside each specimen represents one millimeter.



DIAGNOSIS: Size of *Hemicodon jepseni*, smaller than *Macrotarsius montanus*. P₄ similar to *M. montanus*, inflated paraconid and large metaconid; combining with protoconid to form a molariform trigonid. M¹⁻² with well developed mesostyle joining the ectoloph at the valley between paracone and metacone. P⁴ with broad posterolingual cingulum and low protocone.

DISCUSSION: *M. siegerti* would be difficult to distinguish from *Hemicodon jepseni* on the basis of isolated lower molars. However, the composite dentitions available indicate an animal that had passed the boundary separating *Hemicodon* and *Macrotarsius*.

The development of the mesostyle is different from that of *H. jepseni* because the mesostyle of *H. jepseni* is either separate from the ectoloph or joins it anterior to the valley between the paracone and metacone. The earlier condition is still present in the mesostyle of M³ of *M. siegerti*.

The enlarged and taller paraconid and metaconid of P₄ hint at an even more advanced development in the P³ (unknown in *M. siegerti*) indicating that the posterolingual cingulum of tooth may be expanded as it is in P⁴.

Omomyids have been considered as possible ancestors of the Ceboidea (Gazin, 1958; Simons, 1961; Wortman, 1904), and Simons pointed out the resemblances of *H. jepseni* (*Ourayia uintensis* of his paper) to the South American forms. The resemblances of *H. siegerti* and *M. montanus* (figs. 5, 6) are even more striking, especially to such generalized living forms as *Allouatta*. The development of P₄ in *Macrotarsius* parallels the South American forms. The unknown P₃ of *Macrotarsius* may parallel the South American forms.

TABLE 1

MEASUREMENTS (IN MM.) OF UPPER TEETH, *Macrotarsius siegerti* AND *Hemicodon jepseni*.

	<i>Macrotarsius siegerti</i>					<i>Hemicodon jepseni</i>	
	CM 18646	CM 15717	CM 15052	CM 15610	CM 14549	CM 15056	PUM 16431
P ⁴ Lbuc	3.10	3.10	—	2.82	—	—	2.79
W	4.54	3.97	—	3.95	—	—	3.67
M ¹ Lbuc	4.17	—	—	—	4.05	3.90	3.77
W	5.05	—	—	—	5.10	5.14	4.65
M ² Lbuc	4.24	—	4.16	—	3.80	3.88	3.95
W	5.45	—	5.40	—	5.23	5.50	5.05
M ³ Lbuc	3.71	—	—	—	3.12	3.40	3.47
W	5.08	—	—	—	4.75	4.96	4.64

The Anaptomorphidae and Omomyidae have long been considered tarsiid Primates (Simpson, 1945, Gazin, 1958) but Simons has recently (1961, p.4) questioned the allocation of the Omomyidae. I share his doubt but favor a tentative allocation to the Lorisiformes. The known dental characters of the Lorisiformes seem to me to relate better to the Omomyidae than the Tarsiiformes would.

The main factors in my reasons for considering the Anaptomorphidae and Omomyidae as closely related families are general primate characters, or small size, or location in North America. *Teilhardina* from the European Eocene was first described as *Omomys*, to which it would appear to be closely related, and the recent work of D. Russell has shown how closely related the primate faunas of the late Paleocene of the two continents are.

In review, the known evolution from *Hemiacodon gracilis* of the late middle Eocene (Bridger C & D) to *Macrotarsius montanus* of the lower Oligocene is: from *H. gracilis* to *H. jepseni*, increase in size

TABLE 2

MEASUREMENTS (IN MM.) OF LOWER TEETH, *Macrotarsius siegerti*, *Hemiacodon gracilis*, AND ?*Hemiacodon* sp.

	<i>Macrotarsius siegerti</i>				<i>?Hemiacodon</i>		<i>Hemiacodon</i>
	CM 15674	CM 14601	CM 15147	CM 15122 TYPE	UCM 26009	CM 15068	<i>jepseni</i> PUM 16431 TYPE
P ₄ L	—	—	—	3.31	3.30	—	3.12
Wtr	—	—	—	2.88	2.80	—	2.31
M ₁ or M ₂ L	—	—	4.40	—	—	4.01	—
Wtr	—	—	3.25	—	—	2.55	—
Wtal	—	—	3.56	—	—	2.92	—
M ₁ L	—	—	—	—	—	—	4.07
Wtr	—	—	—	—	—	—	2.79
Wtal	—	—	—	—	—	—	3.26
M ₂ L	—	—	—	—	—	—	4.02
Wtr	—	—	—	—	—	—	2.94
Wtal	—	—	—	—	—	—	3.47
M ₃ L	5.00	5.24	—	—	—	—	5.00
Wtr	3.15	3.11	—	—	—	—	2.75
Wtal	3.30	3.11	—	—	—	—	3.10
Whld	2.05	1.57	—	—	—	—	1.81

and development of mesostyles; from *H. jepseni* to *M. siegerti*, increase in development of the mesostyles, in development of the trigonid of P_4 , and development of a valley between the hypoconulid and entoconid of M_{1-2} ; and from *M. siegerti* to *M. montanus*, increase in size.

?Chumashius sp.

Figure 19

MATERIAL: CM 15069, isolated M_1 from locality 5A, Badwater Creek.

DISCUSSION: This specimen most closely resembles *Chumashius balchi* Stock. However the Badwater tooth is completely unworn and difficult to compare with the worn holotype (Gazin, 1958, plate 13, fig. 1). Both specimens are of similar size and the development of the buccal cingulum is identical. The trigonid of CM 15069 has a medial small paraconid. This cusp is worn in *Chumashius balchi* but the anterior margin of the tooth and the location of the trigonid of M_3 on the Sespe specimen is similar.

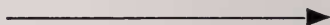


Fig. 9. CM 15130, crown view of an upper molar of *Uintasorex* sp. cf. *U. parvulus*, from Badwater Creek, Wyoming.

Fig. 10. CM 15738, crown view of IP^4 of an omomyid primate from Badwater Creek, Wyoming.

Fig. 11. CM 15106, crown view of rM_1 of *Uintasorex* sp. cf. *U. parvulus*, from Badwater Creek, Wyoming.

Fig. 12. CM 15116, crown view of IM^3 of an omomyid primate from Badwater Creek, Wyoming.

Fig. 13. CM 13913, crown view of IM^{1-3} of *Hemiacodon gracilis* from the Bridger Formation of southwestern Wyoming.

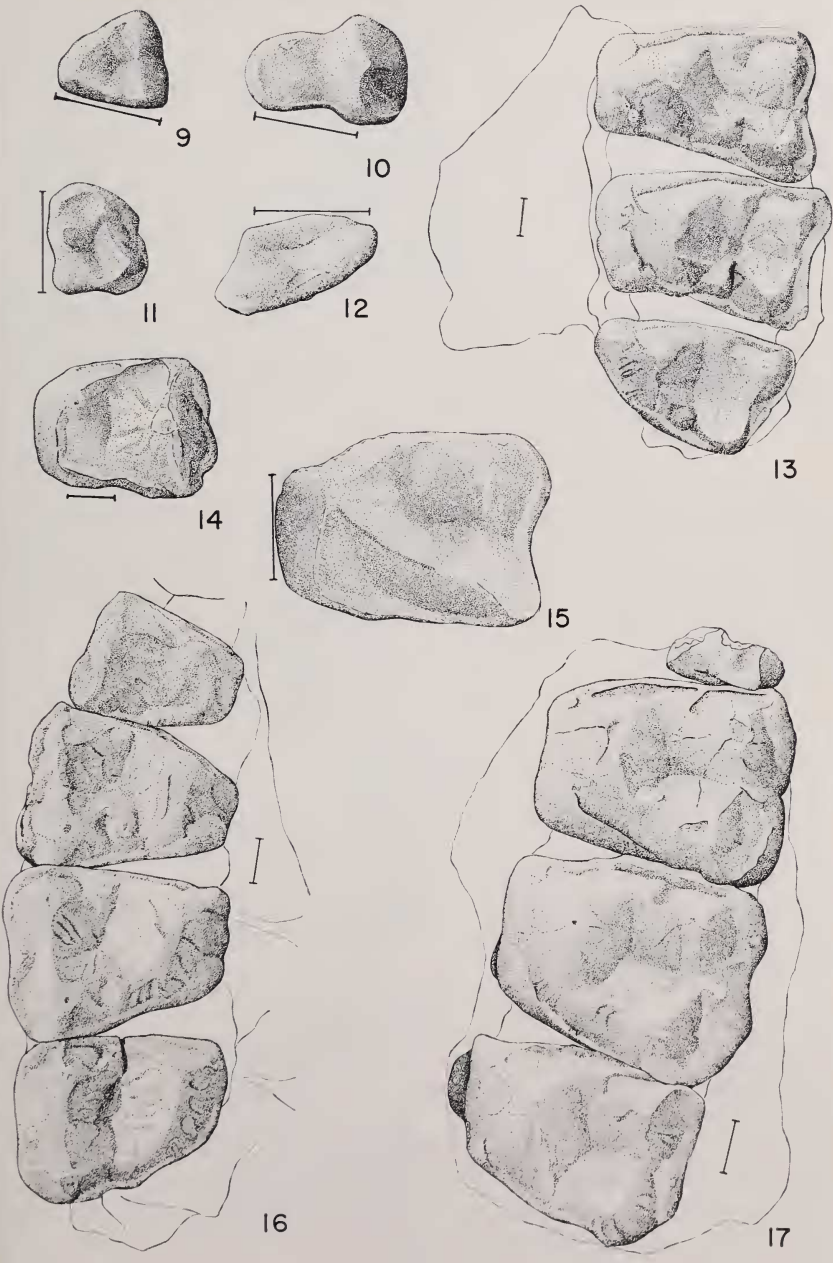
Fig. 14. CM 15610, crown view of IP^4 of *Macrotarsius siegerti*, new species, from Badwater Creek, Wyoming.

Fig. 15. CM 15635, crown view of IM^1 of *Phenacolemur mcgreui*, new species, TYPE, from Badwater Creek, Wyoming.

Fig. 16. PUM 16431, crown view of rP^4-M^3 of *Hemiacodon jepseni*, new species, TYPE, from the Uinta Formation of northeastern Utah.

Fig. 17. CM 15056, crown view of IM^{1-3} of *Macrotarsius siegerti*, new species, from Badwater Creek, Wyoming.

The bar beside each specimen represents one millimeter.



Omomyidae, genus and species unknown

Figure 12

MATERIAL: Two isolated M³s, CM 15603, from locality 5-front; and CM 15116 from locality 5A, Badwater Creek.

DISCUSSION: These two teeth are referred to the Omomyidae on the basis of their morphology and crenulate enamel. They are slightly larger than *Uintasorex* but do not resemble the third molar of that species (Gazin, 1958, pl. 14 fig. 2), whereas they do resemble the M³ of *Omomys* figured by Gazin (1958, pl. 6. fig. 6).

As I have not been able to find any lower teeth that might belong to this species I have not made a tentative allocation to genus. Most Eocene primate taxa are based on lower dentitions and allocation of isolated upper teeth is hazardous at best.

TABLE 3

MEASUREMENTS (IN MM.) ISOLATED OMOMYINE TEETH FROM BADWATER CREEK

Specimen	Homology	L	W	Wtr	Wtal
CM 15069	rM ₁	2.00	—	1.49	1.58
CM 15116	IM ³	0.84	1.50	—	—
CM 15603	rM ³	0.92	1.64	—	—

Subfamily Mytoniinae, new subfamily

TYPE: *Mytonius*, new genus.

INCLUDED GENERA: *Mytonius*, new genus, and *Ourayia*, Gazin, 1958.

KNOWN RANGE: Uintan, late Eocene, of Utah.

DIAGNOSIS: Large Omomyidae, with omomyid-type 4th premolars and anapto-morphid-type molars, that is: with the trigonid of M₂ basically different from the trigonid of M₁, either with a reduced and centrally located paraconid or lacking the paraconid; upper dentition, lower incisors, canine, anterior premolar(s) and M₃ unknown.

Fig. 18. CM 15068, crown view of IM₁ of ?*Hemiacodon* sp. from Badwater Creek, Wyoming.

Fig. 19. CM 15069, crown view of rM₁ of ?*Chumashius* sp. from Badwater Creek, Wyoming.

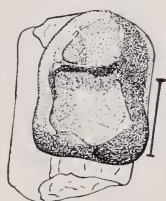
Fig. 20. CM 13914, crown view of rP₄-M₂ of *Hemiacodon gracilis* from the Bridger Formation, southwestern Wyoming.

Fig. 21. PUM 16431, crown view of rP₂-M₁ of *Hemiacodon jepseni*, TYPE, from the Uinta Formation of northeastern Utah.

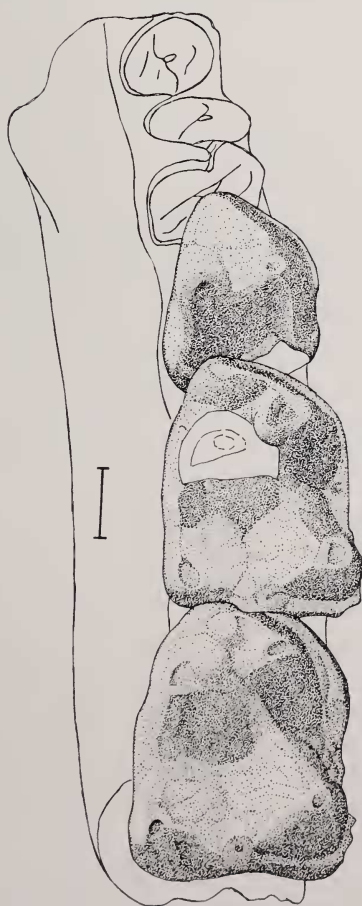
The bar beside each specimen represents one millimeter.



18



19



20



21

DISCUSSION: This subfamily is erected for two monotypic genera because they do not appear to be closely related to the known other genera of the Omomyidae. The omomyid-type P_4 s relate them to other omomyids rather than to anaptomorphids, whose specialized premolars preclude relationship with these animals. Indeed the known premolars of *Ourayia* could easily be derived from the Bridgerian genus *Omomys*. The specialization of this subfamily is in the development of anaptomorphid type M_2 s, a specialization more easily acquired from omomyids than the simpler premolars would have been from anaptomorphids. The last known Nearctic prosimian, *Ekgmowechashala* Macdonald, probably does not belong in this subfamily. The dental morphology of *Ekgmowechashala* (Macdonald, 1963, p. 171) does not resemble *Ourayia* or *Mytonius*.

Ourayia Gazin, 1958

Figure 22

Gazin (1958, p. 70) erected a new genus for the species *Microsypops uintensis* Osborn, 1895, from Uinta B. He mentioned that it resembled *Hemiacodon* but that the paraconid of M_2 was obscured in the anterior crest of the tooth and that the lower molars were lower crowned than in *Hemiacodon*. These characters are pertinent and to them should be added that the talonid basins of M_{1-2} are rounded as in some Anaptomorphidae, with concomitant reduction or loss of the hypoconulid and that P_3 is significantly taller than P_4 or the molars, another distinction from *Hemiacodon*.

I have mentioned above the morphological characteristics of the trigonids of anaptomorphid and omomyid molars where the anaptomorphids have a significant change in morphology between M_{1-2} and little between M_{2-3} , unlike the omomyids. The latter have either similar trigonids on all three molars or a gradual change in which M_2 is usually an intermediate morphology between the trigonids of M_1 and M_3 . Unfortunately only the type specimen and AMNH 1900, a single M_1 of *O. uintensis*, are known to me but there are two specimens from Myton Pocket (Uinta C and therefore younger than *O. uintensis*) which belong to a single species and are described below as *Mytonius hopsoni*, new genus and species.

The premolars of *Omomys carteri* of the Bridgerian are the ones most like those of *Ourayia*, although the molars of the Bridgerian species are more generalized.

Mytonius¹, new genus

TYPE: *Mytonius hopsoni*, new species.

INCLUDED SPECIES: Type only.

KNOWN RANGE: Late Uintan (C) of Myton Pocket, Uinta Formation, Utah.

DIAGNOSIS: Molars of anaptomorphid type, P₄ small, with medial crista obliqua and cusp located in the central portion of the posterior cingulum.

DISCUSSION: As for *M. hopsoni* below.

***Mytonius hopsoni*², new species**

Figures 23, 24

TYPE: YPM 15266, a fragment of right jaw with P₄-M₂, anterolingual portions of P₄ and M₂ damaged.

REFERRED SPECIMEN: CM 12309, an isolated M₂.

HORIZON AND LOCALITY: Uinta Formation, Uinta C (Mytonian), both specimens from Myton Pocket.

DIAGNOSIS: Metaconid of P₄ small and posterior to the protoconid, M₂ with paraconid, small and on the midline. Smaller than *Ourayia uintensis*.

DISCUSSION: The presence of a paraconid and the different morphology of P₄ separates this species from *O. uintensis*. While Simons (1961, p.4) may be right that the type of *O. uintensis*, AMNH 1899, is aberrant in lacking the paraconid, its general morphology indicates that any paraconid present in other members of the species would probably be small and medial.

The type of *M. hopsoni*, YPM 15266, lacks the paraconid-bearing portion of M₂ but preserves a sharp crest trending anterolingually from the protoconid, indicating the presence of some structure in the position of the paraconid. The referred specimen, CM 12309, an M₂, is complete and has a small medial paraconid. Both teeth have the rounded anterior outline of *Ourayia uintensis*.

The presence of the paraconid in *M. hopsoni* and its absence, if significant, in *O. uintensis* perhaps indicates that the younger species is less specialized and therefore did not arise from the older. The ancestor of *M. hopsoni* is as unknown as that of *O. uintensis*.

¹ Named for Myton Pocket.

² Named in honor of Dr. James Hopson, who found the type specimen.

TABLE 4
MEASUREMENTS (IN MM.) OF *Mytonius hopsoni*

	P ₄		M ₁			M ₂		
	L	W	L	Wtr	Wtal	L	Wtr	Wtal
YPM 15266	—	2.39	3.76	2.72	3.02	3.57+	3.30+	3.41
CM 12309	—	—	—	—	—	3.84	3.44	3.71

TABLE 5
MEASUREMENTS (IN MM.) OF *Uintasorex* TEETH

	UCM 28363	CM 15074	CM 15130	CM 15637	CM 15690	UCM 26013	UCM 28362
L	0.64	1.02	1.05	0.80	0.91	0.75	1.04
W	0.84	1.13	1.11	0.95	0.97	0.95	1.07
Identity	IP ⁴	IM ¹ or M ²	rM ¹ or M ²	rM ³	IM ³	IM ³	IM ¹ or M ²
	CM 15008	CM 15106	CM 15647	CM 15694			
L	1.08	1.19	1.12	1.14			
Wtr	0.61	0.60	0.74	0.76			
Wtal	0.74	0.86	0.81	0.90			
Identity	rM ₁	rM ₁	IM ₂	IM ₁			

Infraorder Tarsiiformes Gregory, 1915

Family ANAPTOMORPHIDAE Cope, 1883

Genus *Uintasorex* Matthew, 1909

Uintasorex sp. cf. *U. parvulus* Matthew, 1909

Figures 1, 9, 11

MATERIAL: P⁴, UCM 28363; upper molars, CM 15074, CM 15130, CM 15637, CM 15690, UCM 26013, UCM 28362; lower molars, CM 15008, CM 15106, CM 15647, CM 15694.

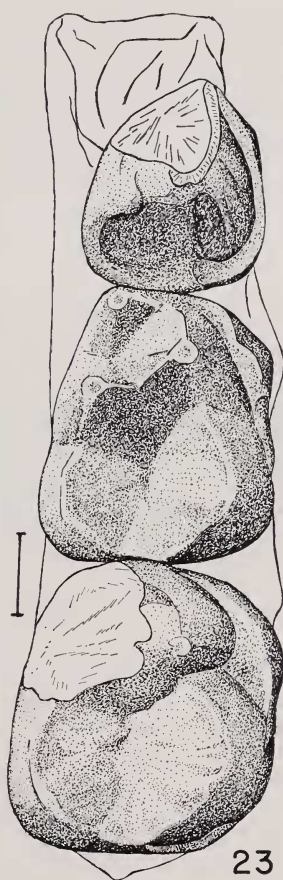
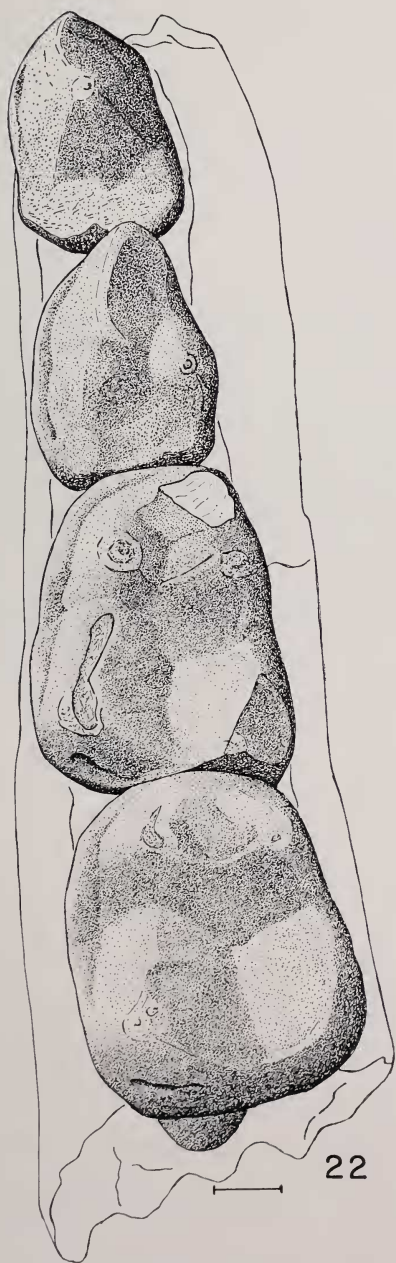
HORIZON AND LOCALITIES: Late Eocene (Mytonian), Badwater Creek localities, 5 front, 5 back, and 5A.

Fig. 22. AMNH 1899, crown view of IP₃-M₂ of *Ourayia uintensis*, TYPE, from the Uinta Formation of northeastern Utah.

Fig. 23. YPM 15266, crown view of rP₄-M₂ of *Mytonius hopsoni*, new genus, new species, TYPE, from the Uinta Formation of northeastern Utah.

Fig. 24. CM 12309, crown view of IM₂ of *Mytonius hopsoni*, new genus, new species, from the Uinta Formation of northeastern Utah.

The bar beside each specimen represents one millimeter.



DISCUSSION: These small teeth are very similar to those of *U. parvulus* from the middle Eocene figured by Gazin (1958, pl. 11) and to those from the Powder Wash collection of northeastern Utah in the Carnegie Museum. The lack of association of these teeth does not permit any additional information on the relationships of *Uintasorex*, but it does extend the range of the genus upwards into the late Eocene.

?Trogolemur sp.

Figure 3

MATERIAL: CM 15066 and UCM 26043, isolated M₁s.

HORIZON AND LOCALITY: Late Eocene (Mytonian), Badwater Creek locality 5A.

DISCUSSION: These isolated teeth most closely resemble the very small Bridgerian primate *Trogolemur myodes* Matthew. They are referred to *Trogolemur* with doubt because of the lack of better material. If the generic assignment is correct then the resemblance of the Badwater fauna to that from the Bridger Formation is increased.

TABLE 6
MEASUREMENTS (IN MM.) OF *?Trogolemur*

Specimen	L	Wtr	Wtal
CM 15066	1.44	1.04	1.13
UCM 26043	1.35	0.90	0.92

Primates *incertae sedis*

Family PAROMOMYIDAE Van Valen and Sloan, 1965

Genus *Phenacolemur* Matthew, 1911

Subgenus *Ignacius* Matthew and Granger, 1921
(new rank; originally described as a genus)

Phenacolemur (*Ignacius*) *mcgrewi*¹, new species

Figure 15

TYPE: CM 15635, an isolated M¹.

REFERRED SPECIMENS: Upper teeth CM 15103, CM 14598, UCM 25049; lower teeth, UCM 26012, UCM 26432, UCM 25175.

HORIZON AND LOCALITY: Late Eocene (Mytonian), Badwater Creek localities, 5 front (Type), 5 back, and 5A.

DIAGNOSIS: Similar to *P. jepseni* in size; to *P. frugivorus* in morphology; hypiconal shelf small as in *P. frugivorus*.

¹ Named after Prof. Paul O. McGrew of the University of Wyoming.

DISCUSSION: The occurrence of such a small and relict species in the Badwater fauna is not surprising. Perhaps the simplicity of the morphology of *Phenacolemur mcgrewi* is surprising, however. This species most resembles the Tiffanian species *P. frugivorus*. Simpson noted (1955, p. 422) that *P. frugivorus* was the "most distinctive" species of *Phenacolemur* but that he believed that its uniqueness did not warrant the retention of generic rank for *Ignacius* (Matthew and Granger, 1921) for the species. I agree with Simpson but suggest that the two species, *P. frugivorus* and *P. mcgrewi* be included in *Ignacius* as a subgenus of *Phenacolemur* characterized by the less inflated hypoconal shelves, simpler lower molars, and weak buccal cingula on the upper molars (Simpson, 1955, p. 421, 422).

The measurements of *P. mcgrewi* listed in table 7 show that the teeth identified as second molars are characteristically smaller than those teeth identified as first molars. This trend is evident in the early Eocene *Phenacolemur* studied by Simpson.

The greater reduction in size noted in the Badwater specimens may be in keeping with a reduction in size in time that Simpson noted for the earlier materials (Simpson, 1955, p. 421, table 1; Robinson, 1966, p. 36, 38).

TABLE 7

MEASUREMENTS (IN MM.) OF TEETH OF *Phenacolemur*
FROM BADWATER CREEK AREA, WYOMING

	Lbuc	W	identity	locality	
CM 15635	2.0	2.78	M ¹	5-front	Holotype <i>P.(I.)mcgrewi</i>
UCM 25049	1.24	1.67	M ²	5A	
CM 14598	1.24	1.81	M ²	5 (A?)	
	Length	Wtr	Wtal	identity	locality
UCM 26012	2.06	1.76	1.61	M ₁	5A
UCM 26432	1.25	1.06	1.15	M ₂	5A
UCM 25175	1.50	1.24	1.33	M ₂	5A

REFERENCES CITED

BLACK, C. C.

1967. Middle and late Eocene mammal communities: A major discrepancy. *Science*, 156 (3771): 62-64.

BLACK, C. C., AND MARY R. DAWSON

1966. Paleontology and geology of the Badwater Creek area, central Wyoming. Part 1. History of field work and geological setting. *Ann. Carnegie Mus.*, 38 (13): 297-307, fig. 1, table 1.

GAZIN, C. L.

1958. A review of the middle and upper Eocene Primates of North America. *Smithsonian Misc. Coll.*, 136 (1): 1-112, figs. 1-16, pls. 1-14, tables 1-4.

MACDONALD, J. R.

1963. The Miocene faunas from the Wounded Knee area of South Dakota. *Bull. Amer. Mus. Nat. Hist.*, 125 (3): 139-238, figs. 1-30, tables 1-31, 2 maps.

ROBINSON, PETER

1957. The species of *Notharctus* from the middle Eocene. *Postilla, Yale Peabody Mus.*, 28: 1-27, figs. 1-5, 2 plates.

1966. Fossil Mammalia of the Huerfano Formation, Eocene, of Colorado. *Bull. Yale Peabody Mus.*, 21: 1-85, figs. 1-9, pls. 1-10, tables 1-35.

RUSSELL, D. E.

1964. Les mammifères Paléocènes d'Europe. *Mém. Mus. Natl. Hist. Nat., Paris, n. ser., ser. C*, 13: 1-324, figs. 1-60, pls. 1-16.

SIMONS, E. L.

1961. The dentition of *Ourayia*: -its bearing on relationships of omomyid prosimians. *Postilla Yale Peabody Mus.*, 54: 1-20, figs. 1-3.

1963. A critical reappraisal of Tertiary Primates. In Buettner-Janusch, John (ed.), *Evolutionary and genetic biology of Primates*. New York, Academic Press, vol. I, pp. 65-129.

SIMPSON, G. G.

1945. The principles of classification and a classification of mammals. *Bull. Amer. Mus. Nat. Hist.*, 85: 1-350.

1955. The Phenacolemuridae, a new family of early Primates. *Bull. Amer. Mus. Nat. Hist.*, 105 (5): 411-442, pls. 30-35, tables 1-46.

WILSON, J. A.

1966. A new primate from the earliest Oligocene, west Texas. Preliminary report. *Folia Primat.*, 4: 227-248, figs. 1-9.

WORTMAN, J. L.

1904. Studies of Eocene Mammalia in the Marsh collection, Peabody Museum. Part II: Primates. *Amer. Jour. Sci.* (4), 17: 203-214, figs. 135-148.